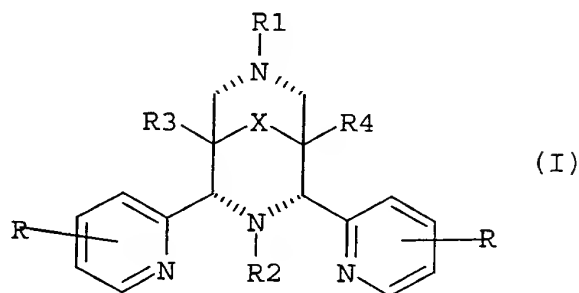


**CLAIMS:**

1. A bleaching composition comprising:

a) a monomer ligand or transition metal catalyst thereof of  
 5 a ligand having the formula (I):



wherein each R is independently selected from: hydrogen, F,  
 10 Cl, Br, hydroxyl, C1-C4-alkyl-O-, -NH-CO-H, -NH-CO-C1-C4-  
 alkyl, -NH<sub>2</sub>, -NH-C1-C4-alkyl, and C1-C4-alkyl;

R1 and R2 are independently selected from:  
 C1-C4-alkyl,  
 C6-C10-aryl, and,

15 a group containing a heteroatom capable of coordinating to a  
 transition metal, wherein at least one of R1 and R2 is the  
 group containing the heteroatom;

R3 and R4 are independently selected from hydrogen, C1-C8  
 alkyl, C1-C8-alkyl-O-C1-C8-alkyl, C1-C8-alkyl-O-C6-C10-aryl,  
 20 C6-C10-aryl, C1-C8-hydroxyalkyl, and -(CH<sub>2</sub>)<sub>n</sub>C(O)OR<sub>5</sub>

wherein R<sub>5</sub> is independently selected from: hydrogen, C1-C4-  
 alkyl, n is from 0 to 4, and mixtures thereof; and,

X is selected from C=O, -[C(R<sub>6</sub>)<sub>2</sub>]<sub>Y</sub>- wherein Y is from 0 to 3  
 each R<sub>6</sub> is independently selected from hydrogen, hydroxyl,

25 C1-C4-alkoxy and C1-C4-alkyl; and,

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b) the balance carriers and adjunct ingredients.

2. A bleaching composition according to claim 1, wherein R1 and R2 are both selected from a group containing a heteroatom capable of coordinating to a transition metal.

3. A bleaching composition according to claim 1, wherein the group containing the heteroatom is:

a heterocycloalkyl: selected from the group consisting of:

pyrrolinyl; pyrrolidinyl; morpholinyl; piperidinyl; piperazinyl; hexamethylene imine; 1,4-piperazinyl; tetrahydrothiophenyl; tetrahydrofuranlyl; tetrahydropyranyl; and oxazolidinyl, wherein the heterocycloalkyl may be connected to the ligand via any atom in the ring of the selected heterocycloalkyl,

a -C1-C6-alkyl-heterocycloalkyl, wherein the heterocycloalkyl of the -C1-C6-heterocycloalkyl is selected from the group consisting of: piperidinyl; piperidine; 1,4-piperazine, tetrahydrothiophene; tetrahydrofuran;

pyrrolidine; and tetrahydropyran, wherein the heterocycloalkyl may be connected to the -C1-C6-alkyl via any atom in the ring of the selected heterocycloalkyl,

a -C1-C6-alkyl-heteroaryl, wherein the heteroaryl of the -C1-C6-alkylheteroaryl is selected from the group consisting of: pyridinyl; pyrimidinyl; pyrazinyl; triazolyl; pyridazinyl; 1,3,5-triazinyl; quinolinyl; isoquinolinyl; quinoxalinyl; imidazolyl; pyrazolyl; benzimidazolyl; thiazolyl; oxazolidinyl; pyrrolyl; carbazolyl; indolyl; and isoindolyl, wherein the heteroaryl may be connected to the -C1-C6-alkyl via any atom in the ring of the selected

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heteroaryl and the selected heteroaryl is optionally substituted by -C1-C4-alkyl,

a -C0-C6-alkyl-phenol or thiophenol,

a -C2-C4-alkyl-thiol, thioether or alcohol,

5 a -C2-C4-alkyl-amine, and

a -C2-C4-alkyl-carboxylate.

4. A bleaching composition according to claim 1, wherein:  
each R is the same; and  $R_3 = R_4$ .

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5. A bleaching composition according to claim 1, wherein  
 $R_3$  and  $R_4$  are the same and are  $-(CH_2)_n C(O)O-C_1-C_4$ -alkyl.

6. A bleaching composition according to claim 1, wherein  
15  $R_3$  and  $R_4$  are selected from the group consisting of  $-CH_2OH$ ,  
 $-C(O)O-C_1-C_6$ -alkyl, and phenyl.

7. A bleaching composition according to claim 1, wherein  
at least one  $R_1$  and  $R_2$  is a 3-C0-C6-alkyl-pyridin-2-yl-C0-  
20 C6-alkyl.

8. A bleaching composition according to claim 1, wherein  $Y$   
= 1

25 9. A bleaching composition according to claim 1, wherein  
 $R_3$  and  $R_4$  are  $-C(O)O-C_1-C_6$ -alkyl.

10. A bleaching composition according to claim 1, wherein  
at least one of  $R_1$  and  $R_2$  is selected from the group  
30 consisting of: 3-ethyl-pyridin-2-ylmethyl, pyridin-2-

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ylmethyl, 3-methyl-pyridin-2-ylmethyl, and 6-amide-pyridin-2-ylmethyl.

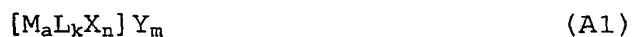
11. A bleaching composition according to claim 10, wherein  
5 at least one of R1 and R2 is pyridin-2-ylmethyl.

12. A bleaching composition according to claim 1, wherein both R1 and R2 are pyridin-2-ylmethyl and R is H.

10 13. A bleaching composition according to claim 1, wherein X is C=O.

14. A bleaching composition according to claim 1, wherein the bleaching composition comprises the free ligand.

15 15. A bleaching composition according to claim 1, wherein the complex is of the general formula (A1):



20

in which:

M represents a metal selected from Mn(II)-(III)-(IV)-(V), Cu(I)-(II)-(III), Fe(II)-(III)-(IV)-(V), Co(I)-(II)-(III), Ti(II)-(III)-(IV), V(II)-(III)-(IV)-(V), Mo(II)-(III)-(IV)-(V)-(VI) and W(IV)-(V)-(VI);

X represents a coordinating species selected from any mono, bi or tri charged anions and any neutral molecules able to coordinate the metal in a mono, bi or tridentate manner;

30 Y represents any non-coordinated counter ion;  
a represents an integer from 1 to 10;

k represents an integer from 1 to 10;

n represents an integer from 1 to 10;

m represents zero or an integer from 1 to 20; and

L represents a ligand as defined in claims 1 to 12, or  
5 its protonated or deprotonated analogue.

16. A bleaching composition according to claim 15, wherein  
M represents a metal selected from Fe(II) - (III) - (IV) - (V).

10 17. A bleaching composition according to claim 16, wherein  
M represents a metal selected from Fe(II) and Fe(III).

18. A ligand of formula (I) according to claim 1 or a  
transition metal catalyst thereof with the proviso that the  
15 following compounds are excluded:

dimethyl 2,4-di-(2-pyridyl)-3,7-bis-(pyridin-2-ylmethyl)-

3,7-diaza-bicyclo[3.3.1]nonan-9-one-1,5-dicarboxylate;

1,5-bis-(hydroxymethylene)-2,4-di-(2-pyridyl)-3,7-bis-

(pyridin-2-ylmethyl)-3,7-diazabicyclo[3.3.1]nonan-9-ol;

20 dimethyl 2,4-di-(2-pyridyl)-3,7-bis-(pyridin-2-ylethyl)-3,7-  
diaza-bicyclo[3.3.1]nonan-9-one-1,5-dicarboxylate;

dimethyl 2,4-di-(2-pyridyl)-3-(5-carboxypentyl)-7-methyl-

3,7-diaza-bicyclo[3.3.1]nonan-9-one-1,5-dicarboxylate;

dimethyl 2,4-di-(2-pyridyl)-3-(2-methoxyethyl)-7-methyl-3,7-

25 diaza-bicyclo[3.3.1]nonan-9-one-1,5-dicarboxylate; diethyl-

2,4-dipyridyl-7-picoly-3,7-diaza-bicyclo-[3.3.1]-nonan-9-

one-1,5-dicarboxylate ; diethyl-2,4-dipyridyl-7-benzyl-3-

hydroxyethyl-3,7-diaza-bicyclo-[3.3.1]-nonan-9-one-1,5-

dicarboxylate; and, dimethyl-2,4-dipyridyl-7-benzyl-3-

30 hydroxyethyl-3,7-diaza-bicyclo-[3.3.1]-nonan-9-one-1,5-  
dicarboxylate.

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19. A ligand of formula (I) according to claim 18 or a transition metal catalyst thereof, wherein at least one of R1 or R2 is pyridin-2-ylmethyl and the other is selected from -CH3, -C2H5, -C3H7, and -C4H9.

5

20. A perchlorate salt of dimethyl 2,4-di-(2-pyridyl) -3,7-di(pyridin-2-ylmethyl) -3,7-diaza-bicyclo[3.3.1]nonan-9-one-1,5-dicarboxylate (N2Py4).

TO THE SECRETARY